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THE DIFFICULTY IN MAKING DIFFERENTIAL DIAGNOSIS BETWEEN ENCEPHALITIS LETHARGICA AND BOTULISM.

By J. C. GEIGER, Epidemiologist, United States Public Health Service.

On or about April 20, 1921, Dr. E. C. Dickson, of the Leland Stanford University Medical School, telephoned the writer regarding a possible case of botulism at the Marine Hospital, San Francisco, Calif. He said that the symptoms were of a suggestive character, and that Dr. Ophuls had performed an autopsy. The Marine Hospital was visited, such data were secured from the history as it was possible to obtain, and an effort was made to get definite information regarding the possible source of the disease and to trace the movements of the deceased.

The history as obtained at the Marine Hospital at San Francisco revealed that the patient had worked up to April 1, 1921. He had been "feeling fine" up to four days prior to the onset of the disease, presumably April 9, when he became dizzy and had double vision. Twenty-four hours later, following chills, patient lost control of tongue and could not eat. Every effort was made to trace the source of the disease, but without success.

On April 13 the patient visited a clinic in San Francisco, where he was referred to the Marine Hospital, the definite diagnosis not being given. The clinical record at the Marine Hospital indicates that the patient's chief complaint was inability to swallow and that he had symptoms of dizziness and double vision. The records also show that diphtheria antitoxin was administered on April 13 and 14 and a culture was taken from the throat. The result of the throat culture was negative for diphtheria. Diphtheria antitoxin was again administered on April 15, and on April 19 the patient steadily weakened and became cyanotic, and died April 20.

The temperature chart shows that the patient had a subnormal temperature except at the time of admission and before death. The pulse averaged 120 up to April 17, when an increase was noted.

Blood counts taken on April 18 showed a white count of 21,600, differential count 91 per cent neutrophiles, and red count of 5,500,000.

An autopsy performed by Dr. William Ophuls, of the Leland Stanford University, reported anatomical diagnosis, encephalitis lethargica; tuberculosis of the lungs, healed; bronchitis, acute; mucopurulent; bronchopneumonia, terminal.

Additional laboratory reports of the microscopical examination of the brain show a slight round cell infiltration, no thrombi, and some accumulation of the leucocytes in and around some blood vessels.

The following additional report upon this particular case was received from Dr. E. C. Dickson, of the Botulism Commission:

MAY 28, 1921.

A piece of the medulla taken at autopsy was given to Dr. E. C. Dickson for examination April 20, 1921. The material was ground up in a sterile mortar and a portion was injected intracranially in a rabbit. The rabbit was sick for several days and almost blinded with a discharge from the eyes, but finally recovered.

The remainder of the ground-up medulla was inoculated into two culture tubes—one of brain medium and the other of meat. Both tubes were oil stratified. The cultures were incubated four days at 37½° C., at which time both tubes had gas and a very foul odor, and there were marked signs of proteolysis.

After a period of about two weeks' incubation at 28° C., the brain culture was filtered and the sterile filtrate was tested against the antitoxins of *B. botulinus* types A and B. The type B antitoxins protected the pig, while the control pig and that injected with antitoxin type A died in 24 hours.

B. botulinus type B, therefore, was isolated from the brain culture of the medulla of this case.

(Signed) GEORGINA S. BURKE.
ERNEST C. DICKSON.

DISCUSSION.

This case is an extremely interesting one. It is regretted that the movements of the patient could not be traced.

The isolation of *B. botulinus* from the brain of this patient (constituting, as it does, the first recorded instance, except that in the case of some experimental animals, yet unpublished) should prove of more than passing interest.

Likewise, it is very evident from this case, the Pueblo, Colo., cases, and those at Battle Creek, Mich., that some official statement should be given out calling attention to the increasing difficulty of proper differentiation between encephalitis lethargica and botulism.

Recent reports, which have made their appearance in the public press and medical literature, and which have even been made the basis for discussion at medical meetings, that many, if not all, of the cases of lethargic encephalitis recently recognized in numerous cities are really botulism caused by preserved food, must be considered incorrect.

Researches conducted as early as 1918 by the Local Government Board in England have proved that sleeping sickness, or encephalitis lethargica, is a separate disease and that it can not be identified with botulism poisoning. These conclusions have been supported by studies conducted by Netter in France and by Simon Flexner in this country. Moreover, botulism is comparatively rare in the United States, whereas numerous cases of sleeping sickness have been recognized in countries where botulism is unknown and canned foods have not been consumed. Sleeping sickness is a febrile disease, associated with early symptoms of the respiratory tract and distinct inflammatory change in the brain tissue. These lesions are not found in botulism poisoning, and the temperature in this intoxication is usually subnormal. Single, rather than multiple, cases of sleeping sickness have been observed in family and other intimate groups of persons. On the other hand, botulism poisoning affects, as a rule, several members of the same household or institution, and the source of the poison can be traced, by the experienced investigator, to some food. Botulism can be prevented by thoroughly cooking all canned vegetables or fruits which have not been previously processed at high temperatures, after they are removed from the container.

DIRECT INOCULATION TEST FOR B. BOTULINUS TOXIN.

Determination of the Presence of B. Botulinus Toxin by Intraperitoneal Inoculation of Laboratory Animals with Suspected Foods.

By I. A. BENGTSON, Bacteriologist, Hygienic Laboratory, United States Public Health Service.

Attention is called to the rapidly fatal effects, with characteristic symptoms, of large doses of toxin and cultures of *Bacillus botulinus* when administered to small laboratory animals, particularly the mouse and guinea pig, by the intraperitoneal route. Results obtained in experiments carried out at the Hygienic Laboratory have suggested the procedure as a simple and expeditious test for the determination of the presence of botulinus toxin in suspected canned foods and, therefore, of use as an aid to the earlier diagnosis of botulism in case the food is available. By direct inoculation of white mice or guinea pigs with the food substance, the delay occasioned by filtration or by isolation of the organism, which may require several days, may be obviated.

The subcutaneous inoculation of guinea pigs or the feeding of the suspected food to chickens has been the method most frequently used in determining the presence of a toxin in suspected food. Graham and Schwarze (1) have recently shown that Type A strains of *B. botulinus* may be identified by feeding suspected contaminated food to chickens, which are not susceptible to the Type B strains. Symptoms appear in from 5 to 6 hours and death occurs after 18 to 24 hours.